[0024] **FIG. 3** is a longitudinal sectional view of a drum-style brake having the magnetic field generators positioned for acting on an enlarged outer periphery making up a working surface of the rotor, and comprising integrated electronics within a second chamber and a torsional return-to-center spring incorporated within the chamber housing the rotor.

[0025] **FIG. 4** is a longitudinal sectional view of a brake similar to that of **FIG. 1**, but showing the magnetic field generator configured for acting on both surfaces of the rotor, and also showing integrated electronics and how a return-to-center torsional spring can be incorporated within the housing for the electronics.

[0026] **FIG. 5** is a longitudinal sectional view illustrating an alternative construction of the brake of **FIG. 3** showing tapered walls to enhance migration of controllable material away from the shaft, and also showing alternative seal and bearing construction.

[0027] **FIG. 6** is a cross-sectional view along line **6-6** of **FIG. 5** illustrating how a connection between a rotor and a shaft may be made and how backlash between the rotor and the shaft may be allowed and implemented.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0028] Now turning to the Figures wherein like parts are referred to by the same numbers in the several views, **FIG. 1** illustrates a first embodiment of the present invention. The brake **11** illustrated in **FIG. 1** is a side coil brake. As the description proceeds it should be understood that although the term "brake" is used to describe the embodiments of the invention the invention is generally a torque generating device that creates a dissipative torque in response to signals received or generated by the device **11**. For purposes of describing the preferred embodiments of the invention the field controllable material is disclosed as a free flowing material with particles randomly dispersed throughout the carrier medium. However, it is contemplated that the field controllable medium may also be comprised of a compacted material where the particles are fixed relative to adjacent particles.

[0029] Brake **11** includes a housing **13** having a first chamber **15** which houses rotor **21** for rotation therein. Optionally, a second housing chamber **17** is provided and the chamber may enclose any combination of control electronics and control devices comprising for example: sensors for obtaining the displacement or velocity of the rotor **21**; an amplifier for increasing the low current signal sent to the field generator **31**; controls for communicating with a vehicle operator or a third party located away from the brake, and a communication means for facilitating such external communication. Such control electronics and control devices are represented schematically in **FIG. 1** and are identified as **25**. The control electronics are used to monitor and/or control operation of device **11**. The present invention brake permits control electronics and devices to be located in the brake housing rather than at locations external to the brake. This provides for a compact brake package and it is believed by locating the sensitive control electronics and control devices internally, the electronics and devices are better protected from dirt and particulate matter than with current devices which require the sensitive electronics to be located external of the device housing. As the description proceeds the components located in the second housing chamber may be described generally as "electronics" or "control electronics" for example, however it should be understood that this term should not be limiting and the inventors do not wish to be limited to only electronic type devices. Rather the term referring to the devices and components housed in the second chamber shall more generally be defined and comprised of any suitable means for controlling and or monitoring operation of the device and such means may be comprised of electronic devices and/or mechanical components.

[0030] For purposes of describing the first embodiment of the invention, rotor **21** is disk-shaped and is supported on a shaft **23** within the housing **13** for rotation within the housing chamber **15**. The rotor includes first and second surfaces and an outer periphery. The surfaces include working portions near the outer periphery at regions on the surface of the rotor upon which the magnetic field acts. The working surface is identified at **42** in **FIG. 1**. A typical magnetic flux line **37** associated with the applied magnetic field is shown dashed in Figure

[0031] Brake housing **13** includes an open end where the first chamber **15** is located and the open housing end and the chamber is closed and sealed by closing plate **19**. The first chamber also contains therein a volume of field controllable material **41** and electromagnetic field generators **29**. The field generators comprise, for example, in one configuration, coil **31** and pole piece **33**. When activated, the magnetic field generator **29** creates magnetic flux **37**. In **FIG. 1** the magnetic flux **37** is represented only on one side of the rotor. However the magnetic field acts toroidally around the longitudinal shaft axis and along the entire working surface **42** near the outer periphery of the rotor. The presence of the magnetic field causes the field responsive material **41** to change its rheology resulting in the development of a higher yield stress that must be exceeded to induce onset of shearing of the field responsive material. Typically, in the absence of a magnetic field, the particles return to an unorganized or freely dispersed state and the apparent viscosity or shear flow resistance of the overall material **41** is correspondingly reduced. By activating the magnetic field, the material **41** acts on the working portion **42** of the rotor **21** to inhibit its rotational movement. The stippling that represents material **41** schematically in **FIG. 1** is shown in an organized manner in **FIG. 1** and the organized arrangement of the particles is a result of the application of field **37**. As may be appreciated, supporting the shaft for rotation are bearings **35** which are shown as ball bearings, but may be comprised of any suitable bearing adapted to support rotation of shaft **23**.

[0032] To keep the field controllable material **41** within the first chamber **15**, conventional seal **27** is provided to maintain the material **41** in chamber **15** between plate **19** and pole piece **33**. The seal may comprise any suitable seal member adapted to prevent egress of the material from its required location in chamber **15**.

[0033] The monitoring and controlling electronics and devices **25** housed within the second chamber **17** may include multiple parts such as a rotating disk which is positionally detected by a sensor fixed within the walls of the chamber **17**. The sensor may or may not be in contact with